

## A NOVEL USE OF SHORT WAVES FOR NAVIGATION IN FOGGY WEATHER

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(Translated from the french)

For warnings in foggy weather use is frequently made of fog-guns installed at the lighthouses, but the firing of these guns when they are located at lighthouses at sea necessitates the presence of an operating personnel under difficult conditions. Thanks to the short waves one may in future operate the fog signal from shore without the need of any personnel stationed by the gun.

Interesting trials have been carried out recently by the *Service Central des Phares et Balises* at a distance of five kilometres between coast and fog gun. The service of the gun was absolutely assured as the latter automatically started in operation if any derangement occurred in the apparatus at either the shore station or the lighthouse.

It suffices to fire the cannon every hour; the electric clocks therefore permit switching on the current for the receiver and transmitter for five minutes during each hour. Thus we obtain the unattended operation of the clocks for a period of six weeks without the slightest inconvenience.

During an interval of five minutes in each hour the absence of the signal sets the system in operation, while the reception of the signal stops its operation. If a breakdown of any kind occurs the signal is not received and the fog gun begins to function.

In order to avoid the possible effect of strays, very short waves, of only 90 cm., are used whose beam may be directed in any determined direction by means of an antenna of small dimensions.

In order to avoid the possible interference of strays due to internal combustion motors of the motor-boats, whose range is, besides, rather short, an intermediate frequency of 125 kilocycles modulated by a musical note of 900 vibrations per second is employed.

The trials of the distant control mechanism were carried out on the gas light of QUERQUEVILLE with a transmitter placed on the top of the tower of the naval station; the range was 4,500 m.

The emission of the ultra-short waves of 90 cm. is accomplished by means of two magnets operating in parallel to increase the reliability.

The modulation is accomplished by a triode valve on 125 kilocycles and the resultant wave is amplified in turn and modulated at 900 cycles per second by a 9 watt pentode.

A commutator insures the service in clear weather and during foggy weather; in the first position the signal is sent, the receiver operates and the operation of the fog-gun is arrested; in the second the emission is not modulated and the fog-gun starts to function at the set time.

The high frequency power is 20 watts and the power supply is 300 w.

The antennae are of the well-known directive type CHREIX-MESNY.

The receiving antenna is of the doublet type, with reflector, having the feeder connection armoured to protect the insulation against the action of the salt air.

In order to insure the reception unattended, the apparatus consists of simply a duo-diode bulb as detector for the ultra-short waves, which permits a very stable tuning of the high frequency resonance circuit.

The signal received is amplified through two stages of tuned amplifiers, received again, and the musical frequency amplified through two resonance stages. The final low voltage frequency, rectified and filtered, then acts upon the triode tube, whose plate is connected to a complex system of relays which controls the electro-magnetic valve of the fog-gun.

The entire apparatus is fed by cadmium-nickel batteries which are well adapted for service where the rate of discharge is low.

Thanks to the use of this method of reception it is possible to maintain a constant setting of the transmitter and receiver, which has been difficult up to the present with the means ordinarily employed, in particular with apparatus of the super-reaction or superheterodyne type.

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